

SUPPORT FOR THE AMENDMENT

Applicants have now amended to claims as suggested by the examiner to clarify that the particle size is of the oil-in-water emulsion. Support for the recited specific gravity is found on page 18, lines 2-13 which identifies a specific gravity as claimed as resulting from mixing. Further support for the amendment to claim 1 is found on page 12, lines 14-24. Support for claims 24-26 is found on page 13, lines 9-15 of the specification. No new matter would be added to this application by entry of this amendment.

Upon entry of this amendment, claims 1-3, 6-11, 14-16, 19-21 and 23-26 will now be active in this application.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a foamed composition obtained by foaming an oil-in-water type emulsion comprising: 7-35 wt.% of an oil phase comprising 30-90 wt. % of diglycerides, 65-93 wt. % of a water phase containing 15-60 wt. % of sugars and/or sugar esters and an emulsifier having an HLB of 8 or more, the emulsion having a volume-average particle diameter of 0.9 μm or less and the composition having a specific gravity of 0.1-0.9 g/cm^3 .

Applicants wish to thank examiner Metzmaier for the helpful and courteous discussion held with their U.S. representative on November 27, 2007. At that time applicants' U.S. representative argued that improved sweetness was discovered resulting from foaming a diglyceride oil-in-water emulsion having sugars in the aqueous phase and having an average particle diameter of 0.9 μm or less. The following is intended to expand upon the discussion with the examiner.

Foamed composition of oil-in-water type emulsions are commonly found as food compositions. Diglyceride containing compositions have received interest in view of

disclosed beneficial health effects. Incorporation of diglyceride compositions into foamed oil-in-water type emulsions such as ice cream coatings and frozen sweets is desired. However, good foaming characteristics have not always been observed. Diglyceride compositions having good foaming characteristics and foam shape keeping ability have been reported by the combination of a liquid diglyceride and hydrogenated oil (JP 63-301765) (see pg 2, lines 1-4 of applicants' specification). However, hydrogenated oils, having been used as foaming fat or oil, carry the detriments of high saturated fatty acid and high trans acid contents (pg 2, lines 6-8 of applicants' specification). Accordingly, a diglyceride containing foamed oil-in-water type emulsion having good foaming properties, a sweet taste and a low saturated fatty acid content is sought.

The claimed invention addresses this problem by providing a foamed composition obtained by foaming an oil-in-water type emulsion comprising a 7-35 wt.% of an oil phase comprising 30-90 wt.% of diglycerides which comprises at least 80 wt. % of unsaturated fatty acids and 0 to 20 wt. % of saturated fatty acids, 65 to 93 wt. % of a water phase comprising 15 to 60 wt.% of a sugar and/or sugar alcohol and an emulsifier having an HLB of 8 or more, the emulsion having a volume-average particle diameter of 0.9 μm or less and the composition having a specific gravity of from 0.1-0.9 g/cm^3 . Applicants have discovered that such a maximum volume-average particle diameter advantageously provides for foamed composition of an oil-in-water emulsions with an excellent sweet taste. Such a foamed emulsion is no where disclosed or suggested in the cited references of record.

As evidence of the improved sweet taste by selection of the average particle diameter to be 0.9 μm or less, and in particular from 0.05 to 0.3 μm (claim 23), the examiner's attention is again directed to examples 1-5 and comparative example 1 appearing in applicants' specification (pages 19-33). The data is presented below.

| | Example 1 | Example 2 | Example 3 | Example 4 | Comparative Example 1 | Example 5 |
|---|--------------|----------------|----------------|--------------|-----------------------|--------------|
| Fat or oil Composition | 1 | 2 | 3 | 1 | Comparative 1 | 1 |
| Triglycerides | 13.1 | 63.4 | 12.2 | 13.1 | 97.9 | 13.1 |
| Diglycerides (1,3-diglycerides) | 85 (56.8) | 35.1 (23.9) | 85.6 (57.1) | 85 (56.8) | 1 (-) | 85 (56.8) |
| Monoglycerides | 1.8 | 1.4 | 2.1 | 1.8 | 1.0 | 1.8 |
| Free Fatty Acids | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| High pressure emulsifying treatment (MPa) | 19.6 | 19.6 | 19.6 | - | 19.6 | 176 |
| Average particle diameter (μm) | 0.47 | 0.43 | 0.48 | 2.35 | 0.41 | 0.09 |
| Sweet taste | B | B | B | C | D | A |

Examples 1, 4 and 5 were prepared using the fat and oil composition 1 described on page 24 of applicants' specification. Examples 2 and 3 illustrate improved sweet taste for two emulsion compositions which differ from example 1.

Examples 1 and 4 have identical compositions but differ in the average particle diameter. The smaller particle diameter of from 0.43-0.48 demonstrated improved sweet taste, relative to the larger particle size of 2.35 μm .

Example 5 was prepared using the same oil of example 1, but at an even smaller particle size of 0.09 and had both a sweet taste which was not heavy but very excellent. Thus, this smallest particle size range provided the best sweet taste. Such an improved sweet taste performance by selection of volume average particle size is not suggested by the cited references of record.

Page 8 of the official action criticized the data as not directed to the claimed subject matter. Applicants note that the claims have been amended, as suggested by the examiner, to more clearly indicate that the particle size is that of the oil-in-water emulsion prior to foaming and therefore the data presented is commensurate in scope with the claimed subject matter.

Further, applicants note that the water phase used in examples 1-4 and comparative example 1 contained 45 wt. % of glucose and maltose, which falls within the scope of claim element (B) of 15-60% by weight of sugars, sugar alcohols and mixtures thereof.

Page 9 of the official action questions how comparative example 1 was prepared. Applicants note that comparative example 1, is described on page 27 of the specification as having been prepared using oil composition 1. The oil phase was mixed with the water phase and the mixed phase was pre-emulsified using a homomixer. Next, the pre-emulsion was subjected to a high pressure emulsifying treatment, stored at 5°C for 20 hours and then the average particle diameter determined (pages 27 and 28). Foams were then prepared by stirring with a Hobart mixer and the specific gravity measured. Accordingly, the record is clear that examples 1 and 4 and comparative example 1 are prepared from the same fat or oil composition 1, example 4 being subject to only the pre-emulsion treatment, example 1 and comparative example 1 being subject to high-pressure emulsifying treatment resulting in differing average particle diameters. While the office action suggests a matching of the emulsification ability of the emulsifiers to the oils as influencing the particle size, the data as to examples 1, 4 and comparative example 1 makes clear that identical compositions may be processed to yield different average particle sizes.

Further, the official action suggests that a sweeter taste would be expected from a smaller emulsion droplet size with the sugar residing in the continuous aqueous phase.

Applicants note that a **smaller emulsion droplet size** for the oil phase will **increase the surface area of the oil phase**, containing no sugar, and for this reason a person skilled in the art would expect that the emulsion would have a decreased sweetness. Applicants have discovered to the contrary, that when the emulsion droplets are broken, the emulsion will have a decreased sweetness. According to the claimed invention, the emulsion droplet size of the oil phase is smaller and accordingly the emulsion droplets are more difficult to break.

While not wishing to be bound by any particular theory, this is believed to be the source of the observed increased sweetness.

While the official action suggest the claimed particle size range to be obvious, example 1 and comparative example 1 make clear that differing particle sizes may be obtained from the same emulsification technique and therefore the known use of a known emulsification method does not make obvious the specific particle size range of 0.9 μm or less.

The rejections of claims 1-3, 6-11, 14-16, 19-21 and 23 under 35 U.S.C. § 103(a) over Nomura et al. EP 402,090 in view of Chiou et al. U.S. 5,378,286 and Cook et al. U.S. 4,533,254 and over Nomura et al. EP 402,090 in view of Ono et al. U.S. 5,962,058 and Lichtenstein et al. optionally in further view of Chiou et al. U.S. 5,378,286 and Cook et al. U.S. 4,533,254 are respectfully traversed.

None of the cited references disclose or suggest a foamed oil-in-water type emulsion of 7 to 35 wt. % of oil phase and 65 to 93 wt. % water phase comprising 15-60 wt. % of sugars having a volume-average particle diameter of 0.9 μm or less.

Nomura et al. describes an edible oil-in-water emulsion comprising a diglyceride mixture having an increasing melting point of 20°C or below (pg 2, lines 31-34). There is no discussion of having a volume-average particle diameter of 0.9 μm or less.

Examples 10-12 describe foamed compositions containing a sugar in the aqueous phase the emulsions being formed by sequential steps of a homomixer and then a homogenizer. However, none of these examples suggest a volume-average particle diameter of 0.9 μm or less nor an improved sweet taste arising therefrom.

In contrast, the claimed invention is directed to a foamed oil-in-water type emulsion comprising 7-35 wt.% of an oil phase, 65-93 wt. % of a water phase containing 15-60 wt. % of sugars and/or sugar esters and emulsifier having an HLB of 8 or more, the having a

volume-average particle diameter of 0.9 μm or less. Applicants note, the claims have been amended to recite the presence of an emulsifier in view of the examiner's view that an emulsifier is present in the demonstrated examples.

As the reference fails to describe the effect that the average particle diameter would have on sweetness, it clearly can not suggest an improved sweet taste by selection of a volume average particle diameter of from 0.9 μm or less.

Claim 23 is separately patentable in view of applicants' demonstration of the highest performance in the sweet taste property.

The secondary references do not cure the basic deficiencies of the primary reference.

Each of Chiou et al. and Cook et al. have been cited for the use of a microfluidizer. However, neither reference suggests an improved sweetness resulting from a particle size of 0.9 μm or less. Choiu et al. merely describes the use of a microfluidizer in the mechanical disintegration of an aqueous dispersion of a hydrolysate (column 19, lines 38-47) and is not even related to an oil-in water emulsion. Cook et al. is directed to a technique in forming a microemulsion and does not suggest that an improved sweetness would be realized from a particle size of 0.9 μm or less.

Ono et al. fail to describe a volume-average particle size of 0.9 μm or less. The reference has no disclosure as to particle size and accordingly can not suggest an improved sweetness by selection of particle size.

Lichtenstein et al. has merely been cited to describe the preference of the cis form of fatty acids as compared with the trans form based on the disclosed effect on the serum lipoprotein cholesterol level. However, this reference fails to disclose or suggest a volume average particle size of 0.9 μm or less.

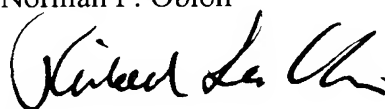
As the cited combination of references do not suggest a foamed oil-in-water type emulsion comprising 7-35 wt.% of an oil phase, 65-93 wt. % of a water phase containing 15-

60 wt. % of sugars and/or sugar esters and an emulsifier having an HLB of 8 or more and having a volume-average particle size of 0.9 μm or less, the claimed invention is clearly not rendered obvious by the cited references. Accordingly, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Applicants submit that this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Richard L. Chinn, Ph.D.
Registration No. 34,305

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)